THE AIRCRAFT ACCIDENT BOARD SHALL SUBMIT THIS REPORT TO THE C.O. OF THE ACTIVITY CONDUCTING THE INVESTIGATION. IT SHALL THEN BE FORWARDED BY THE C.O. IN ACCORDANCE WITH CURRENT AAR INSTRUCTIONS.

1. DATE OF ACCIDENT	HOUR	2. ACTIVITY SUBMITTING REPORT	3. AAR SERIAL NO.
1 October 1954	1225U	UTILITY SQUADRON SEVEN (VU-7)	4-54

4. MODEL A/C	BUNO.	CHECK DAMAGE TO A/C	5. REPORTING CUSTODIAN OF A/C
F9F-2	123509	[X] A [ ] B [ ] C [ ] D [ ] E	UTILITY SQUADRON SEVEN (VU-7)

6. NAME OF UNIT OPERATING THE A/C / BASED AT / OPERATIONAL CHAIN OF COMMAND: UTILITY SQUADRON SEVEN, NAS, NORTH ISLAND, SDIEGO, COMUTWINGPAC, COMAIRPAC, CINCPACFLT

7. LOCATION OF ACCIDENT: Bearing 318°-Distance 54 miles from LOVELOCK Nev. Radio on the Black Rock Desert Gun. Range

8. UNIT TO WHICH OPERATOR ATTACHED: UTILITY SQUADRON SEVEN

9. PERSONNEL INVOLVED (Including name and injury code of those injured, not occupants of A/C)

A. FULL NAME, RANK, SERVICE, FILE NO. (List person in control first)	B. AGE	C. BILLET	D. POSITION	E. INJURY
3 [redacted] ENS Group I "A" [redacted]/1325	23	Pilot	Cockpit	D

10. PILOT EXPERIENCE	TOTAL ALL MODELS	TOTAL THIS MODEL	LAST 12 MONTHS ALL MODELS	LAST 3 MONTHS ALL MODELS	LAST 3 MONTHS THIS MODEL
TOTAL HOURS	549.4	78.3	296.0	139.8	78.3
INSTRUMENT HOURS			21.7	12.9	.4
NIGHT HOURS			3.4	1.9	
CV LANDINGS DAY/NITE	12	NONE			

INSTRUMENT RATE: STD
PILOT'S AGE: 23
DATE DESIGNATED: 20 JAN 54

11.	12. PURPOSE OF FLIGHT	CODE	13. TIME IN FLIGHT
~~XXXXX~~ COST 225,763.00	Air-to-Air Tow	TM	1 hr. 0 min.

14. TYPE OF ACCIDENT	CODE	15. MANEUVER INVOLVED
Engine fire/Collision with ground	FB	Towing banner target for Air-to-Air Gunnery

16. WEATHER	CEILING	VISIBILITY	17. DARKNESS?	18. CLEARANCE ISSUED
[X] VFR [ ] IFR	20,000	15	[ ] YES [X] NO	Local VFR

19. WIND DIRECTION	FORCE	20. ATTITUDE ON IMPACT	ANGLE OF IMPACT	STOPPING DISTANCE	SPEED ON IMPACT	21. DID FIRE FOLLOW IMPACT?
360	2	Port Wing Down Nose Down	20°	30 Ft.	EST 200 Kts.	[X] YES [ ] NO

22. AIRCRAFT AND ENGINE DATA (Fill in all data in every case of material failure or malfunction, actual or suspected)

HISTORY	SERVICE TOUR	MONTHS IN THIS TOUR	TOTAL NUMBER OF OVERHAULS	FLT HOURS SINCE OVERHAUL	FLT HOURS SINCE ACCEPTANCE	TYPE OF CHECK LAST PERFORMED	FLT HOURS SINCE CHECK	NO. DAYS SINCE CHECK
AIRCRAFT	2	10	1	261.6	914.5	2M	25.7	11
	MODEL ENGINE	SERIAL NO. OF ENGINE						
ENGINE 1	J-42-P-8	PL01212		98.4	164.1	2M	25.7	11
ENGINE 2								
ENGINE 3								1(
ENGINE 4								

HAS THIS A/C BEEN DAMAGED IN PREVIOUS ACCIDENT(S) DURING PRESENT SERVICE TOUR? [ ] YES [X] NO
IF "YES", GIVE DATE(S) OF PREVIOUS ACCIDENT(S):
BuAer SERIAL NUMBER FOR THIS ACCIDENT, IF SUBMITTED:

23. CONTRIBUTORY FACTORS (Check or fill in only one primary "P" factor; all others secondary "S")
P [X] S [ ] Other Personnel Error
P [ ] S [X] Material Failure or Malfunction

24. CHECK CONDITIONS INVOLVED IN THIS ACCIDENT (List other)
[ ] X-WIND, STACKWASH, SLIPSTREAM, TURBULENCE [ ] PITCHING OR ROLLING DECK [ ] COMMUNICATION DIFFICULTY [ ] AIRPORT HAZARD [ ] ROUGH SEAS [ ] TERRAIN CONDITIONS

25. EMERGENCY CONDITIONS
[ ] IMMEDIATE FORCED LANDING [ ] PRECAUTIONARY LANDING [ ] ENGINE FAILURE [ ] FUEL EXHAUSTION OR NEAR EXHAUSTION

26. PERSONNEL SAFETY EQUIPMENT USED
[X] PARACHUTE [X] EJECTION SEAT [X] SHOULDER HARNESS [X] SAFETY BELT [ ] EXPOSURE SUIT [ ] G-SUIT [X] PROTECTIVE HELMET [X] OXYGEN EQUIP.
[ ] LIST OTHERS: First Aid Kit, Survival Pack, Panel Markers

MEDICAL OFFICER REPORT SERIAL NUMBER: NO Ser. NAAS FALLON OF 4 OCT

27. ENCLOSURES AND DISTRIBUTION CHECK OFF LIST.

CHECK	ENCLOSURES
X	STATEMENTS: PILOT
	STATEMENTS: LSO
X	STATEMENTS: ENG. OFF.
	STATEMENTS: CAT. OFF.
X	STATEMENTS: WITNESSES
X	STATEMENTS: OTHERS
X	PHOTOGRAPHS
	DRAWINGS
X	WEATHER REPORT
	LOADING MANIFEST

CHECK	NO.	DISTRIBUTION BY COMMANDING OFF.
	ORIG.	CNO (OP-57) VIA CHN. OF COMD.
	2CC	NAVAVSAFACT DIRECT
	2CC	BUAER DIRECT
		CHECK AND LIST OTHERS AS REQUIRED
	1CC	BAR GRUMAN A/C
	1CC	FASRON 8 DET., FALLON
	1CC	COMAIRPAC (Direct)
	1CC	VU5, VU3, VU7 File
	1CC	CO, NAAS, FALLON
	1CC	COMFAIRALAMEDA
	1CC	COMUTWINGPAC (Direct)

28. SIGNATURES OF BOARD MEMBERS

[redacted] CDR, (MC), USN
Flight Surgeon
(Member)

[redacted] LT, USNR
Ass't Flight Officer
(Member)

[redacted] LT, USNR
Ass't Operations Officer
(Member)

[redacted] LCDR, USN
Operations Officer
(Senior member)

DATE SUBMITTED TO C.O.

29. THE ACCIDENT

F9F-2, Bureau Number 123509, side number UH-42, departed NAAS, Fallon, Nevada, at 1145U, 1 October 1954, on a IM air-to-air towing flight with ENS (b) (6) as pilot. UH-42 proceeded to Trego, Nevada, the rendezvous point for the Black Rock Desert gunnery area. At approximately 1145U, UH-42 rendezvoused with a flight of four (4) F9F-6 Cougars assigned to VF-191. Beginning time on the range was approximately 1200. At the end of ten (10) minutes, the pilot reversed course and headed back down the range. At approximately 1215, (b) (6) heard a muffled explosion (thud). He immediately started losing power and speed, and noticed smoke and fumes in the cockpit. An investigation of the cockpit by the pilot showed that the tail pipe temperature had climbed to the peg (1000° C), and the white warning light in the center of the tail pipe temperature indicator was on. The pilot immediately reduced power and called the VF-191 flight leader, saying he was in trouble and to break off firing runs. At this point the banner and all external stores were jettisoned. The tail pipe temperature was exceeding its limit while carrying 55-60% power. The tail pipe temperature warning light was still on and the fire warning lights were on. At approximately this time VF-191 flight leader (knothead), flew wing on UH-42 and advised that UH-42 was emitting intermittent puffs of white smoke. When Knothead leader got very close he advised UH-42 that he could see metal melting in the area of the turbine on the top of the starboard side of the fuselage, at air frame station 299-322 (refer to ANOI-85FG-3 Page 9). When Knothead flight leader saw this he transmitted, "Jackstay-42, you're burning, get out of it". At this time the pilot of UH-42 saw Knothead flight leader motioning with his hands, to eject. (b) (6) then transmitted "Mayday, Mayday, Mayday, Jackstay-42 bailing out". After tightening his shoulder straps the pilot pushed the pre-ejection lever down, jettisoning the canopy and forcing the leg braces up. He pulled the curtain and felt a terrific force pushing up. After tumbling, he unbuckled the quick release, felt the seat leave and pulled the rip cord. (b) (6) landed near a water hole dazed and shocked but without serious injury. After the pilot ejected, the plane continued in a shallow port orbit and crashed approximately three miles south of the pilot's location.

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30. DAMAGE TO THE AIRCRAFT

In reconstructing the crash it is evident that the aircraft was in a shallow port spiral at the time of initial contact with the ground. It is believed that the port wing tip tank dug into the soft earth, causing it to yaw, then cartwheel. The starboard wing, engine, cockpit and tail section sheared loose on main impact. The port wing, port landing gear and part of the fuselage were embedded in a 5 foot deep, 15 foot wide crater created by the impact and simultaneous explosion.

The aircraft struck the desert at an estimated angle of 20-25° and a speed of about 200 knots. The aircraft disintegrated upon impact and exploded as evidenced by enclosures 11 through 18. All instruments were demolished by fire and impact and were useless for any determination of attitude or condition. The largest piece of the wreckage was a portion of the tail assembly as shown in enclosure (15). Debris of the wreckage was scattered over one-third of a mile from initial impact area. Number three (3) combustion chamber, along with four (4) others, were recovered comparatively intact. It was evident that the skin of the fuselage, in the area of the turbine had been weakened and, by the time of the impact with the ground, perhaps as much as 30% of the structure could have been destroyed. The latter partly accounting for the complete separation of the after section (engine jet) on impact and traveling the greatest distance from the initial impact area.

The aircraft received strike damage. Salvage of the aircraft is not deemed economical nor necessary due to the extreme damage. The aircraft crashed on government land in a remote section of the gunnery range not accessible to the public.

Certified to be a true copy
(b) (6)

3l. THE INVESTIGATION

The investigation of the accident revealed the following facts:

a. Ensign (b) (6) underwent aviation training at Pensacola, Florida, and Corpus Christi, Texas from June 1952 until January 1954. He completed training with 367.0 hours.

b. Ensign (b) (6) flight record during training and while in this command indicates that he is an above average pilot.

c. Since reporting to this command 7 May 1954, he has qualified in the SNB, THM, F8F, and F9F-2 type aircraft. Having received a total in the latter of 78.3 hours.

Ensign (b) (6) had flown this same aircraft on two previous tow missions the same day (a total of 3.0 hours) prior to the flight during which the accident occurred. There had been no discrepancies this day nor since the last check was performed. He had been airborne this flight for fifty-nine (59) minutes prior to the accident. On this flight he was conducting air-to-air tow. The tow was streamed from the starboard wing rack station, which put the tow about 7 feet to the starboard of the fore and aft axis of the aircraft. He was using 1000 feet of tow cable which will permit a droop of 80 feet at 165 knots indicated at 15,000 feet altitude.

The pilot was returned to NAAS, Fallon, Nevada, and turned into sickbay at about 1830 for examination and observation. Results of the examination, as performed by Doctor (b) (6) at NAAS, Fallon, were forwarded by that activity on an unserialized form 3750-8 Medical Officers report dated 4 October 1954. Although the pilot was suffering from shock, he was coherent, and a complete resume of the events incident to the accident was obtained. Pilot's statement is enclosure 1.

News of the accident was relayed by telephone from NAAS, Fallon, Nevada, to the squadron's home base (NAS, North Island, San Diego, California) at 1240U. The Aircraft Accident Report Board arrived at Fallon at 1800U to commence it's investigation.

The aircraft crashed about 130 miles from NAAS, Fallon, in a nearly inaccessible area of the Black Mountain gunnery range. The Board members reached the scene of the accident about noon Saturday, 2 October 1954. The aircraft was identified by the bureau number, 123509, painted on the tail section (See enclosure 15).

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All parts in the area were examined by the board for possible contribution to the accident. Inasmuch as most parts were charred, bent or broken, identification was quite difficult. The number three (3) combustion chamber was recovered. (See enclosure 19). It appears to have been penetrated by a projectile about the size of a 20MM shell. The direction of entry and exit corresponds to that of a projectile being fired from astern and slightly from the starboard side of the tow aircraft. Upon exiting from the combustion chamber, the projectile probably caused shrapnel from the chamber cover to enter into the turbine.

The number three (3) combustion chamber was submitted to NAS, North Island O & R Laboratory for an analysis to determine if conclusive evidence could be obtained that a 20MM round did penetrate the chamber. The laboratory analysis is forwarded as enclosure 20. The laboratory findings were; that an object partially composed of a copper bearing alloy caused the penetration of the number three (3) combustion chamber.

Other evidence indicates that a second round entered the tail hook assembly housing and penetrated inside to out from approximately the same angle of fire as that mentioned above. (See enclosure 18). However, this is not considered to have affected the flight characteristics of the aircraft in any manner. The assumption that this hole was caused by an external object

Certified to be a true copy
(b) (6)

is reasonable inasmuch as there is nothing aft of this section of the aircraft to cause such a penetration upon impact with the ground.

32. THE ANALYSIS

The primary cause of the accident was an internal fire in the vicinity of the number three (3) combustion chamber. It is the Board's opinion that a projectile from an external source entered the base of the combustion chamber, traveled forward through it, and egressed through the combustion chamber cover. Secondary cause of loss of power is considered to have been caused by pieces of schrapnel from the chamber cover traveling into and damaging the turbine blades. It is theorized that the latter did not cause complete stoppage because: (a) the aircraft maintained flying speed in a low angle decent and (b) investigation of the turbine wheel and component parts revealed that it was revolving at comparatively high speed on impact.

The projectile that penetrated the number three (3) combustion chamber is believed to have entered the aircraft fuselage in the vicinity of air frame station 360 on the starboard side about 10 inches above where the wing root faring joins with the fuselage.

Damage to one combustion chamber would possibly reduce the total thrust by fifteen (15) to twenty (20) percent. This fact is substantiated by the fact that the pilot was able to maintain near straight and level flight and the travel of the aircraft after the pilot ejected.

Inasmuch as there is evidence of two 20MM penetrations, the possibility of them being caused by ricochet off the banner tow bar is very remote.

The possibility of the pilot remaining with the aircraft and attempting to return it to Fallon or Gerlock was very remote. His decision to eject was in all respects sound, considering that he was cognizant of the structural damage to his aircraft as told to him by the flight leader of the F9F-6 flight.

All safety equipment functioned properly. The pilot and eye witnesses to the ejection state that all the sequences of the ejection were normal.

Particularly helpful in this accident was the pilot's use of the panel markers. This enabled other aircraft to keep him in sight and to direct the rescue party to him in the minimum amount of time.

33. CONCLUSION AND RECOMMENDATION

a. It is the conclusion of the Aircraft Accident Board that the primary factor causing the initial fire and ensuing accident was a twenty millimeter (20MM) projectile from one of four F9F-6 type aircraft then firing on the banner towed by Ensign (b) (6)

b. It is further concluded that there is no pilot error attributable to Ensign (b) (6) in connection with this aircraft accident.

Recommendations

a. As a means of preventing future similar accidents it is recommended that a system of scoring hits be devised, that would penalize the individual for any hit on the banner that causes a tear hole in excess of a predetermined length, which is representative of a round fired at the safety cone limit. It is the opinion of the board that competition within some squadrons is so great that some of the less experienced pilots are taking advantage of the smaller deflection shots within the safety cone in an attempt to obtain better scores.

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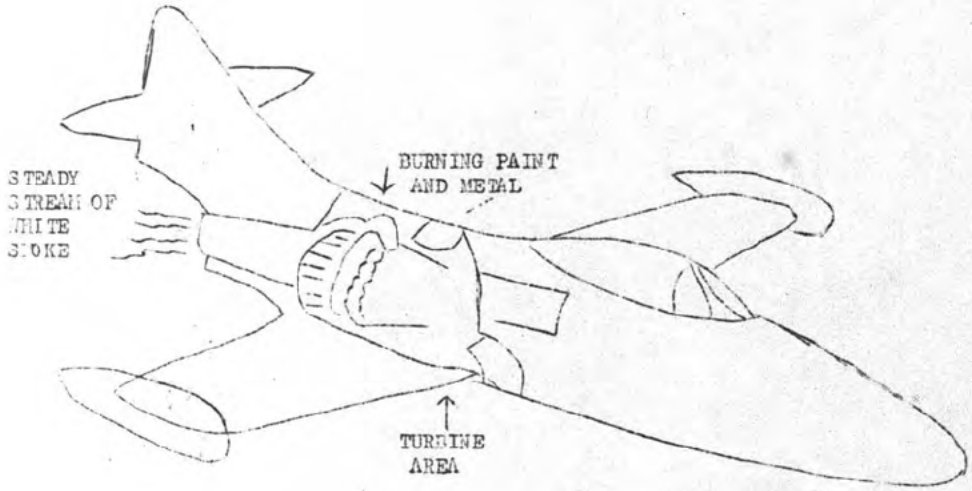
(b) (6)



(b) (6)
CAPT USAF

18

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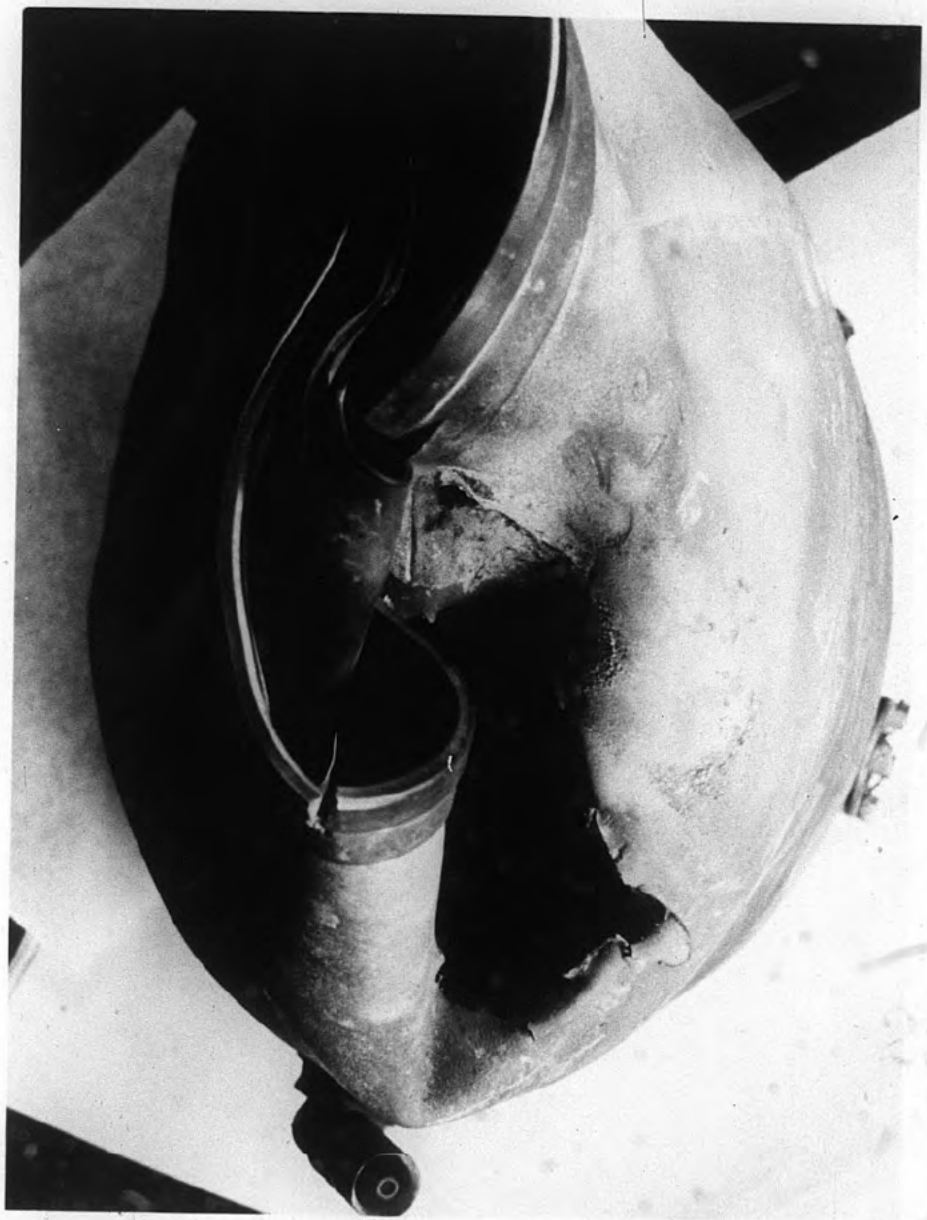
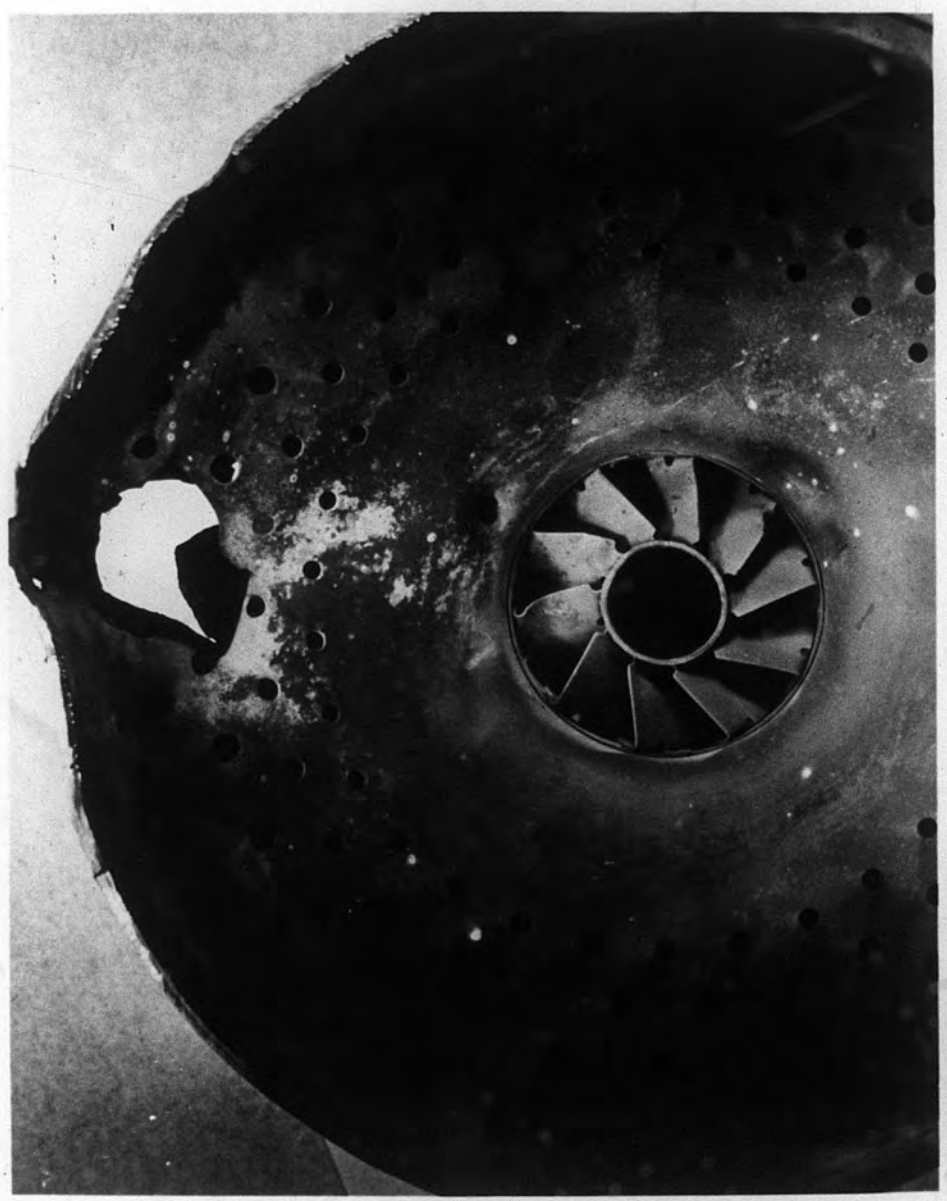
(b) (6)



ENCLOSURE (10)-1

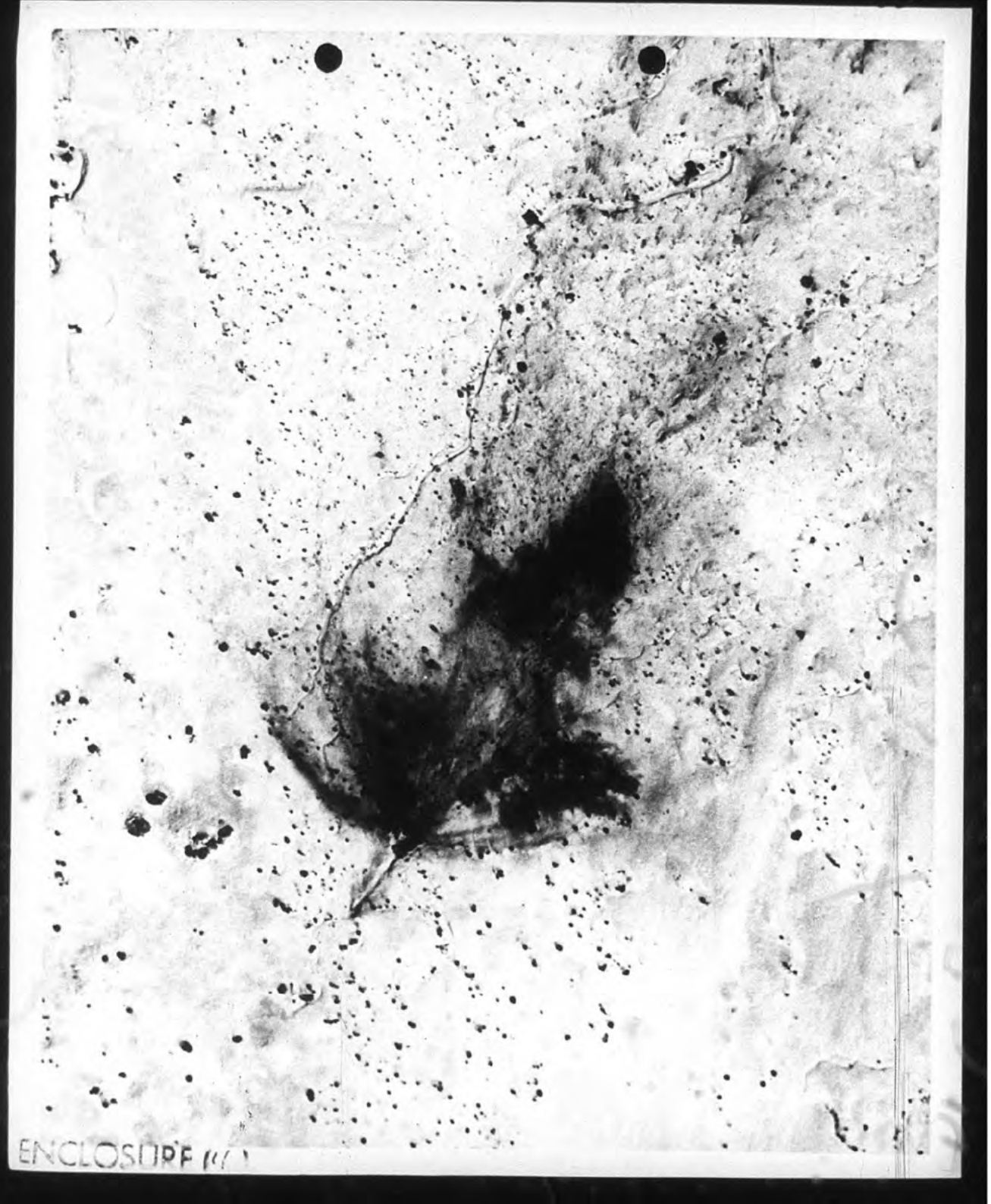
10-2

ENCLOSURE Vol. -3



U.S. Naval Air Station
San Diego, California
Materials Testing Laboratory

ENCLOSURE (10) - 4


ENCLOSURE (1)

ENCLOSURE (12)

32

ENCLOSURE (3)

ENCLOSURE (14)

34

ENCLOSURE (15)

35

ENCLOSURE (16)

ENDOSURE (1)

ENCLOSURE (19)